

of a gale such as would just blow a kite line from ship to shore needs reconsideration.

Little has been published about Prof. Langley's experiments beyond a reference to the accident which gave Prof. Manley a premature bath in the Potomac.

The idea of combining a glider and boat was tried initially with success and ultimately with failure by Herr Kress on a reservoir a few miles out of Vienna, near the main railway line from Germany. Major Baden-Powell has adopted the same plan at the Crystal Palace. The machine descends a kind of chute from a height of about thirty feet, and is shot off into the air about six feet above the water. With this small height it is not unlikely that successful glides might be made even if the steady motion were longitudinally unstable, for by careful projection several wave-lengths might safely be described in the air before the pitching became dangerous.

It is probable that a motor driven machine travelling at high speed would be much more stable than a gravity machine, but to understand the management of the machine is a necessary condition of success, and the more this can be made the subject of mathematical study the easier will the task be for an aeronaut who is perfectly familiar with the equations of motion. In regard to the effect of speed on stability, the pretty butterfly-like "helicoptera" driven by elastic must not be quoted as instances. They raise themselves nearly vertically; we are concerned with machines moving nearly horizontally.

From all that has been said above it will be seen that there is plenty of work to be done in connection with aerial navigation. At the present time, careful quantitative measurements of the coefficients of stability of actual machines by attaching them to whirling tables are even more needed than further balancing experiments in mid-air.

G. H. BRYAN.

#### PHAISTOS AND HAGIA TRIADA, CRETE.

IN the south of Central Crete, a day's journey from Candia on a good horse, lies the scene of discoveries no less important than those of Dr. A. J. Evans at Knossos. They consist of the ruins of two palaces, one large and one small, but both built on the same general plan and with the same materials (stone and concrete) as that which has made Dr. Evans famous. There can be no doubt that all three belong to one age and one social system; that they were under one Government is clear from the fact that none of the three were fortresses. Crete was, in fact, as Thucydides told us long ago, a sea-power which had no fear of assault by land. With the architectural or historical interest of these remains we need not concern ourselves at present, nor with the general character of the articles found in them. In all three we meet with vessels of use and ornament, painted frescoes, inscribed blocks or tablets, seals, human and animal figures, and articles of domestic or religious character. But in or near Hagia Triada there came to light a number of objects of special interest which distinguish that palace, smallest of the three, above the others.

First there is a sarcophagus of stone, painted upon all four sides. Each of the two ends bears a chariot in which are two female figures; a pair of horses draws one, a pair of griffins the other. The two sides bear a representation of sacrifice to the dead. Men leading animals—bull, goat, or sheep—women with baskets of fruit, others with bowls apparently full of wine or some other liquid, which is being poured into a large jar; a flutist and a harper, playing upon

a lyre of seven strings (which are therefore older than Terpander by a thousand years); men carrying animals in their arms; and lastly the dead man himself, standing beside a tree before his own tomb and receiving the pious offerings. A most noteworthy fact in this representation is that the men wear women's skirts.

Next come three vases of steatite, each bearing a scene carved in relief. The workmanship of these carvings is astonishing for its finish, and the designs are full of life, reminding us not distantly of good Attic work. On one vase a couple of youths stand face to face, one leaning upon a spear or staff, the other bearing over his shoulders a staff and a whisk of some sort. Both are naked, save for the familiar loincloth of the Mycenaeans (which the Greeks never wore, except in the very earliest times at the Olympian games), and high boots of the same kind which are still worn in Crete and always have been. The second vase represents several pairs of men, some wrestling and some boxing, and a bull-hunt or bull-baiting. The boxers have their hands bound about with straps of leather, or something like a fingerless glove. Some of these men wear helmets, which in part at least seem to be made of metal; and helmets hitherto have been undreamt of at this period.

But the last vase is the most striking of all. It bears a procession of men marching two and two, led by a personage clad in a stiff bell-shaped tunic covered with scales. He is bareheaded and carries a long staff or sceptre resting upon his shoulder. The men behind him wear flat caps something like to a turban, and loincloths, and each carries over his left shoulder a long pole branching out into three long flexible wands at the end. In the middle of the procession are four men singing, one bearing the *sistrum* of Isis; these have no wands. Some see in this a triumphal procession of soldiers after war. The lack of arms or shields makes this unlikely; the three-pronged objects can hardly be weapons, for they seem to be flexible, but what they are it is impossible to say. Those are more likely to be right who believe it to be a harvest festival of some kind, and the three-pronged implement an implement used in some harvesting process. If we may assume that these objects have no use at all, but are ornamental (which is not likely), the whole might be a religious procession without regard either to war or husbandry.

#### NOTES.

THE Bakerian lecture of the Royal Society will be delivered by Dr. Horace T. Brown, F.R.S., on March 23, upon the subject of "The Reception and Utilisation of Energy by the Green Leaf."

It is proposed to erect in Jena a memorial to Prof. Ernst Abbe, so that all who see it may be reminded of his great services to optical science and industry, and his sterling qualities as a man. Abbe's work and influence are appreciated wherever physical science and sociology are studied, and there should be no difficulty in obtaining sufficient funds to raise a noble monument to his memory. The committee organised for this purpose includes the names of Dr. Czapski, Dr. Eggeling, Dr. G. Fischer, Prof. Rosenthal, and Prof. Winckelmann. Subscriptions for the memorial should be sent to the treasurer, Dr. Gustav Fischer, Jena.

Science states that the Prussian Academy of Science has awarded its Helmholtz medal to Prof. Ramón y Cajal, professor of neurology at Madrid.

It is announced that Prof. Albert B. Prescott, professor of organic and applied chemistry, dean of the school of pharmacy and director of the chemical laboratory of the University of Michigan, died on February 26 in his seventy-third year.

We learn from the *Times* that negotiations are in active progress for the amalgamation of the Society of Arts and the London Institution. A scheme has been prepared by a joint committee, and it only remains to be submitted to the general body of the members, whose assent in all likelihood will be given.

A COMMITTEE of the French Physical Society has arranged to have a medal struck in commemoration of M. Alfred Cornu.

THE Royal Society of Naples (mathematical and physical section) has awarded its prize of 40*l.* to Prof. E. Pascal, the subject being the theory of the invariants of the ternary quartic with special reference to the conditions for splitting into inferior forms. A prize of 20*l.* is now offered for the best essay in Italian, Latin or French on "The theory of electrons and the dispersion of light." The last day for sending in is June 30, 1906, and the essays are to be submitted under a pseudonym.

SINCE our note on the late Prof. Emilio Villari appeared in last week's *NATURE*, we have received a copy of the *Rendiconto* of the physical and mathematical section of the Neapolitan Royal Society (x., 8-11) containing another notice of Prof. Villari by Prof. L. Pinto. It differs from the previous notices in containing a general summary of the scope of Villari's works, classified under the various headings of acoustics, molecular mechanics, heat, light, electricity, and Röntgen rays, and it will be found a very useful notice for purposes of reference, especially for physicists, whose time is limited, interested in Villari's researches.

THE *Lancet* states that the King has acceded to a suggestion that the skeleton of Ambush II., the famous steeplechaser from the Royal Stables which died some weeks ago, should find a place in the Museum of Veterinary Anatomy at the University of Liverpool. The skeleton will be mounted and placed in a prominent position at the University museum, and a plate will be affixed giving a short history of the well-known horse.

IT is announced in the *Electrician* that Lord Kelvin will be the recipient of the first John Fritz gold medal awarded by the joint committee of the four national American engineering societies, under the deed of gift, to the man most representative of, and eminent in, scientific advance in the engineering field. This medal was founded three years ago on the occasion of the eightieth birthday of John Fritz, the famous inventor and engineer in the iron and steel industry, who is still enjoying excellent health.

ON Tuesday next, March 21, Prof. W. E. Dalby will deliver the first of a course of two lectures at the Royal Institution on "Vibration Problems in Engineering," and on Thursday, March 23, Mr. Thomas G. Jackson will begin a course of two lectures on "The Reasonableness of Architecture." The Friday evening discourse on March 24 will be delivered by Sir Oliver Lodge, his subject being "A Persevering Current," and on March 31 by Prof. J. Wright on "The Scientific Study of Dialects." Prof. Meldola will give the first of his two lectures on "Synthetic Chemistry" (experimental) on Thursday, April 6.

The Liverpool correspondent of the *Lancet* states that Mr. J. E. S. Moore, who has become director of cancer research in succession to Prof. A. S. F. Grünbaum,

has also been appointed a member of the staff of the Royal Infirmary, Liverpool, in accordance with the terms of the donation that the research work in cancer should be carried on at that infirmary. From the same source we learn that, in response to an appeal made for funds to initiate a permanent memorial to the late Sir W. M. Banks, the sum of 552*l.* has been subscribed. Of this amount, the sum of 150*l.* is to be devoted to founding a lectureship, to be attached to the University of Liverpool, and to be called the "Mitchell Banks lectureship." The University authorities will be enabled to invite yearly a distinguished surgeon, pathologist, or anatomist to treat of the latest investigations and discoveries in medical science.

AT the Optical Convention to be held in May next at the Northampton Institute, Clerkenwell, to which attention has already been directed in these columns, the following amongst other papers will be read. Dr. R. T. Glazebrook, F.R.S., will deliver the presidential address. Mr. H. Dennis Taylor will read a paper on some properties of lens systems; Mr. Walter Rosenhain will deal with two subjects—the mechanical design of instruments, and some problems relating to optical glass; Dr. C. V. Drysdale will discuss binoculars, and, in collaboration with Mr. S. D. Chalmers, will introduce a discussion on aberration; Mr. J. Gordon will take up the question of diffraction in optical instruments; Mr. J. Blakesley, some optical measurements; Mr. J. H. Sutcliffe, ophthalmometers; Dr. R. M. Walmsley, education in optics; Prof. Forbes, spectroscopic vision; Prof. Poynting, F.R.S., a parallel plate micrometer; and Dr. W. Watson, F.R.S., fused quartz for optical purposes. Full particulars of the convention can be obtained from the secretary, Mr. C. L. Redding, at the Northampton Institute, Clerkenwell, E.C.

THE March number of the *American Journal of Science* contains a short account of the work of Prof. A. S. Packard, who died in Providence, R.I., on February 14, at the age of nearly sixty-six years. Prof. Packard was graduated from the Maine Medical School and the Lawrence Scientific School in 1864. At Cambridge, Mass., he was one of that remarkable group of students—Hyatt Morse, Packard, Putnam, Scudder, Shaler and Verrill—associated with the elder Agassiz in the early 'sixties. He served for a time in 1864-5 as assistant surgeon in the U.S. Army, but never became a regular practitioner of medicine, his life being devoted to his chosen work in zoology and geology. He was specially distinguished as an entomologist, and he was an enthusiastic field naturalist, collector, and explorer, and a voluminous author who wrote on a remarkably wide range of subjects. He will probably be longest remembered for his original work on insects and his several text-books on entomology and zoology. Early in his career he accepted the theory of evolution and later became an ardent neo-Lamarckian. One of his last works was "Lamarck, the Founder of Evolution, his Life and Work." He was one of the founders of the *American Naturalist*, for twenty years its chief editor, and a constant contributor to its pages. Prof. Packard was a member of the National Academy of Sciences and of many other scientific societies.

THE ceremony of transferring the museum of the Hastings and St. Leonards Museum Association to the Corporation of Hastings took place on March 1. The museum is a representative one, and is divided into several sections. The anthropological section includes a cosmopolitan ethnological collection, geographically arranged. In it are some good local bronze and bone objects, a series of

Neolithic stone implements from many parts of the world, an ethnological collection from New Guinea and the South Sea Islands, the relics recovered from the Hastings kitchen middens—numbering many thousands of specimens—and many worked flints of the Palæolithic period. The geological section is remarkable for its collection of animal remains of the Pleistocene period from the Lewis Abbott collection, and a collection of Wealden fossils from the neighbourhood. The biological section has a representative collection of the local fauna. After the museum had been accepted by the Mayor on behalf of the Corporation of Hastings, Sir Arthur Rücker, F.R.S., delivered a short address, in which he emphasised the value of museums in the study of natural science, and commended the active part municipal authorities are now taking in educational work. Dr. J. J. H. Teall, F.R.S., expressed the opinion that local museums should illustrate local natural history, and outlined a plan which would secure this end. Sir Harry Johnston, G.C.M.G., K.C.B., also spoke on the value of museums.

A BOTTLE thrown overboard in latitude  $29^{\circ} 30' N.$ , longitude  $68^{\circ} 10' W.$ , by Colonel Swalm, U.S. Consul at Southampton, in May, 1903, has just been found on the Donegal coast, Ireland, near Arranmore. The bottle had apparently been carried by the Gulf Stream along the North American coast, then across the Atlantic to the Irish coast. To travel this distance it had taken 662 days at an approximate speed of five miles a day.

ACCORDING to a Reuter despatch from St. Petersburg, dated March 9, the North Pole Commission has officially declared that the expedition under Baron Toll to the new Siberian Islands, in the Arctic Ocean, has ended with the death of all the members of the party. The party sent in search of the expedition found in Bennett Island a letter written by Baron Toll saying that the members of the expedition had continued on their journey though having only eighteen or twenty days' provisions left. It is therefore believed that Baron Toll and his companions perished of hunger.

THE *Weekly Weather Report* of March 11 issued by the Meteorological Office showed that the rainfall from the beginning of the year was still deficient in all districts except the north of Scotland and the north of Ireland; the deficiency amounted to 2 inches and upwards in several parts of England and in the south of Ireland. During the recent severe gales, however, falls of about an inch in twenty-four hours have been recorded in several localities. In the neighbourhood of London the rainfall during the part of the present month already elapsed has exceeded the mean for March, which is 1.5 inch.

AN exhibition of meteorological instruments with photographs and records of meteorological phenomena, under the auspices of the Royal Meteorological Society, was opened on Tuesday at the Institution of Civil Engineers, Great George Street, Westminster, and the exhibition will remain open until 5 p.m. to-morrow, Friday. The instruments exhibited represent all branches of meteorology, and show clearly the great advance which the science has made in recent years. Continuous records can now be secured in nearly all branches, and in many of these ample choice is provided. There are several forms of self-recording rain-gauges, notably the Beckley and the Richard patterns, while Halliwell's improved float pattern pluviograph is of more recent invention, and of exceptional scientific value. The thermometer exhibits are fairly numerous, and of various designs, from Callendar's electrically recording

thermometer to instruments of an ordinary character. There are to be seen the thermometers in use in Sir J. C. Ross's Antarctic Expedition, 1839-43, and in the Arctic expeditions 1850-59, as well as thermometers used by the National Antarctic Expedition 1901-4. These instruments show the greater degree of accuracy obtainable in manufacture now than was the case, say, half a century ago. Barometers and barographs exhibit considerable advance. An instrument of considerable value is Dines's self-recording mercurial barometer; and a microbarograph, for the study of minor variations of atmospheric pressure, under the joint names of Mr. W. H. Dines and Dr. W. N. Shaw, is likely to prove of much value. A typical climatological station is shown, its enclosure containing all the necessary instruments in position for observation. A prominent position is given to aéronautics, and there are specimen kites with meteorograph in position. There are anemometers of very varied description, many of these being self-recording. Sunshine recorders, past and present, are to be seen, from the wooden bowl, by Campbell, used as early as 1853, to the almost perfect instrument known as the Campbell-Stokes. Among the many drawings and photographs may be mentioned the water-colour drawings made during the recent National Antarctic Expedition, exhibiting sky and cloud effects. The Royal Meteorological Society is to be congratulated on the thoroughly interesting character of the exhibition.

PROF. H. HERGESELL has communicated to the *Comptes rendus* of the Paris Academy of Sciences, January 30, some of the preliminary results of the kite ascents made on the yacht of the Prince of Monaco in the Mediterranean and North Atlantic Ocean in the summer of 1904. Altogether, twenty-five ascents were made, eight in the Mediterranean, one in the Baltic, and sixteen in the Atlantic. The principal object of the latter was the exploration of the meteorological conditions in the region of the trade winds. The results show that in the lowest strata of the air there is a considerable decrease of temperature with increase of altitude; the adiabatic gradient ( $1^{\circ} C.$  per 100 metres) is always attained, and even exceeded in the lowest stratum. The depth of this adiabatic stratum varies from 100 to 600 metres; the relative humidity at the sea-level is 70 or 80 per cent., and rises gradually to 95 or 100 per cent. At the upper limit of this stratum a sudden change occurs; the temperature rises quickly by several degrees, and the humidity suddenly diminishes to below 50 per cent. The temperature continues to rise, through a stratum sometimes extending to a depth of 1000 metres, and the humidity decreases to 10 or 20 per cent.; at a height of 1000 metres, temperatures of  $30^{\circ} C.$  are experienced, while at the sea-level only  $22^{\circ}$  or  $23^{\circ}$  are recorded. Above this stratum the adiabatic gradient again holds, but the humidity is low, compared with that of the first adiabatic stratum. In the lower stratum the N.E. trade is experienced, the velocity being about sixteen miles an hour; with increasing elevation the wind gradually shifted through N. to N.W., and in two instances it shifted through E. to S.E. and S. A south-westerly current, which would correspond to the theory of anti-trades, was never exhibited by the kites, although they several times exceeded the height of the Peak of Teneriffe. The velocity of the N.W. or S.E. winds experienced in the highest strata did not exceed seven or nine miles an hour, and was generally still less in the intermediate strata.

THE latest issues of the *Proceedings* of the U.S. National Museum include a description, by Dr. Stejneger, of a gecko and three frogs from the Philippines, and an article by Mr.

Gill on the gurnard commonly known as *Prionotus stearnsi*, which is made the type of a new genus.

THE structure of the squamoso-parietal crest in the skulls of the horned dinosaurs of the Cretaceous of Alberta is deemed by Mr. L. M. Lambe of sufficient interest to merit a paper by itself, and he has accordingly described this part of the skeleton in a recent issue of the *Transactions* of the Royal Society of Canada (vol. x., sect. iv.).

OUR weekly budget includes copies of Nos. 3 and 4 of the *Sitzungsberichte* of the Vienna Academy for the current year. Among the notes is one by Prof. Molisch on phosphorescence in eggs and potatoes after cooking, and a second by Dr. F. Werner on the Orthoptera of the Egyptian Sudan.

IN the January number of the *American Naturalist*, Mr. J. Stafford discusses the larva and spat of the Canadian oyster, the latter of which is extremely minute and very difficult to discover. Unlike the later stages, the very young spat presents a dark metallic lustre. When once recognised, the young spat is, however, by no means difficult to discover, and the sailors soon became adepts in the search. Although found on many kinds of shells, and sometimes on stones, the spat displays a preference for the young of *Crepidula fornicate* and colonies of *Ralfsia verrucosa*.

TO the *Biologisches Centralblatt* of February 15, Mr. J. P. Lotsy contributes an article on "X-generation and 2X-generation," in which he proposes a theory to explain certain features connected with cell-development and heredity. In the second article in the same issue Mr. E. Wasmann seeks to explain the origin and development of slavery among ants, showing the manner in which a colony of *Formica truncicola* may have been gradually modified from a type in which a certain number of stranger ants were received as guests, to one in which a host of captives are maintained.

THE *Otago Daily Times* of January 6 contains an article on the marine fish-hatchery at Portobello and the progress recently made there. The institution was nominally opened a year ago last January, but it was by no means in good working order, having to contend with such difficulties as leaky tanks. Work during the past year has been to a great extent confined to observing the behaviour of a few kinds of food-fishes in captivity. Many of these died off quickly when introduced into the tanks, some, apparently, on account of having been injured in their capture, and others owing to a difference in the temperature of the water. Blue cod, however, thrive well, although the endeavours to rear the fry were unsuccessful. The introduction of the European lobster is contemplated.

MR. L. FREDERICO, director of the class of science in the Belgian Royal Academy, sends us a copy of an essay (from the *Bulletin* of the Academy for December last) on the Glacial fauna and flora of the plateau of Baraque-Michel, the culminating point of the Ardennes. The boreal conditions of climate have, it appears, preserved on this exposed plateau a small colony of animals and plants of an essentially arctic type, the nearest relatives of which are to be met with only in the extreme north, and on certain much higher mountains in central Europe. This assemblage seems to be at the critical stage as regards temperature, a very slight elevation of which would lead to its disappearance. We thus have a definite refutation of the prevailing idea that the temperature of this part of Europe has been higher at some date since the Glacial epoch than it is at the present day.

NO. 1846, VOL. 71]

THE February number of the Johns Hopkins Hospital *Bulletin* (vol. xvi., No. 167) is mainly devoted to anatomy. The teaching of anatomy is discussed by Mr. Mall, who also writes on the working of the Anatomy Act (U.S.A.) and preservation of material, and the anatomical department of the University of California is described by Dr. Flint. Three papers dealing with points in the development of the kidney, a review of Flechsig's researches on the brain, and an article on body-snatching in England complete the contents of an excellent number.

ON the subject of the mandrake or mandragora, Mr. C. B. Randolph has collated, in the *Proceedings* of the American Academy of Arts and Sciences (vol. xl., No. 12), a number of references from the classics, from which he concludes that, on account of its narcotic qualities, it was employed as an anaesthetic about the first century of the Christian era.

EXPERIMENTS by Mr. E. S. Salmon showing that "biologic forms" of *Erysiphe graminis* can be identified according to their power of infecting different species of cereals have been previously referred to. Pursuing his investigations on the subject, Mr. Salmon states, in the *Annals of Botany* (January, 1905), that portions of a host plant which is normally immune, become susceptible to infection by the fungal conidia if they are injured or subjected to heat or the action of anaesthetics, but the conidia produced as a result of such infection cannot attack a healthy plant of the same species. The practical application of this fact is far reaching, as a wheat-rust can in this way spread to barley leaves which have been injured by animals or storms.

WITH the object of arousing interest in the subject of the giant trees of Victoria—all species of *Eucalyptus*—Mr. N. J. Caire has collected data as to size, height, and localities of specimens known to him in a paper published in the *Victorian Naturalist* (January, 1905). Big Ben, a specimen of *Eucalyptus amygdalinus*, possessing a trunk of 57 feet girth, was destroyed by a bush fire in 1902, and Billy Barlow, a blackbutt of the same circumference, was sacrificed for the Paris Exhibition; both these veterans were probably more than a thousand years old. Most of these trees of enormous girth present signs of senile decay, as shown by broken tops or later by hollow stems.

THE results of recent experiments have proved conclusively, says the *Pioneer Mail*, that silk of excellent quality can be raised in Ceylon, and samples of cocoons raised at Peradeniya from European seed have been classed by a European expert as second only to the best Italian silk. Hitherto all experiments have been on a small scale, limited partly by the comparative scarcity of mulberry trees. The time seems now to have arrived when more extensive operations might be undertaken with advantage; and, with this object, it is proposed that an experimental silkworm rearing establishment be created. A scheme is under consideration by the Ceylon Board of Agriculture.

SOME interesting observations of the spark discharge from a Holtz machine are described in a paper by Dr. L. Amaduzzi in the *Atti* of the Italian Electrotechnical Association for 1904. Marked variations in the character of the discharge were observed with varying atmospheric conditions.

THE peculiar photographic activity of hydrogen peroxide has recently been considered by Graetz to be due to a special radiation, in virtue of the fact that its influence is capable of penetrating solid bodies, particularly thin

sheets of metals. It is, however, shown by J. Precht and C. Otsuki, in the *Verhandlungen* of the German Physical Society (vol. vii. p. 53), that hydrogen peroxide itself is capable of penetrating thin films of gelatin, celluloid, india-rubber and black paper, the peroxide being subsequently capable of detection by titanic acid. Metals in the form of the thinnest sheet are, nevertheless, impervious to hydrogen peroxide, if small holes be not present; the same is true of thin films of paraffin, glass, and ebonite.

Two papers dealing with the accurate measurement of coefficients of expansion are contained in the January number of the *Physical Review*. Mr. H. McAllister Randall describes the determination of the coefficient of expansion of quartz between the temperatures of  $36^{\circ}$  and  $500^{\circ}$  C. by means of Pulfrich's optical method, and shows that up to about  $250^{\circ}$  C. the expansion of quartz follows a straight-line law; between  $250^{\circ}$  and  $470^{\circ}$  C. it is necessary to include a term involving the square of the temperature, whilst at  $500^{\circ}$  C. a sudden large increase in the expansibility becomes visible. At this temperature it is probable, as suggested by Le Chatelier, that quartz undergoes a change into a second modification having very different physical properties from those of the ordinary form. The second paper, by Mr. H. D. Ayres, deals with the measurement by Pulfrich's method of the coefficients of linear expansion of the metals aluminium and silver at temperatures between  $100^{\circ}$  and  $-184^{\circ}$  C.

THE firm of Leybold Nachfolger in Cologne has recently issued a very complete and interesting catalogue of physical apparatus and fittings sold by them. The book starts with a history of the instrument trade in Cologne during the last century. In its second section we find an account of the construction and fittings of various chemical and physical institutions. It is noteworthy, perhaps, that while the students' laboratory, with its work tables and appliances for experiments, figures prominently in the chemical institutions, the arrangements for practical work by the students in the physical laboratories are distinctly less complete. After this follows the catalogue proper, filling some 800 large pages, profusely illustrated and admirably arranged. The book will be most useful to the teacher, and is a striking illustration of German enterprise and go. At the same time it is observable throughout that the apparatus is intended chiefly for demonstrations and the lecture-room. The list of electrical measuring instruments, for example, is comparatively meagre, while there are not many examples of the simpler forms of apparatus supplied to an English school laboratory for use by the students. It is probably the case that such apparatus is less used in Germany than here, but though this is absent the book is full of apparatus of the greatest value and utility.

A SECOND edition of Prof. Luigi de Marchi's "Meteorologia generale" has been published by the house of Hoepli, of Milan. The book has been revised and enlarged.

A SECOND edition of the "Rural Calendar," fully revised and enlarged, has been prepared by Dr. A. J. Ewart and published by Messrs. Davis and Moughton, Ltd., Birmingham. The book is a helpful index to observations of animate nature throughout the year, and a guide to gardening and farming operations. It includes an artificial key to the commoner wild British herbs, giving description, common name, scientific name, and natural order. By using this key as plants become available, a good knowledge of common flowers may be obtained. The price of the book is one shilling net.

NO. 1846, VOL. 71]

#### OUR ASTRONOMICAL COLUMN.

STRUCTURE OF THE CORONA.—In an interesting paper published in No. 3 (1905) of the *Revue générale des Sciences*, Dr. Ch. Nordmann discusses the structural details of the solar corona and their causes. In the first place, he shows that the incurvation of the coronal rays cannot be due solely to the action of gravitation, for the angles which they make with the normals to the limb at the points of their projection are far too small for this theory.

He then shows that the "minimum" corona, which obtains at the time when the solar surface is least disturbed simply assumes the form natural for it to assume under the action of centrifugal force, if it be granted that the particles forming the coronal streams are exactly balanced in the solar atmosphere—that is to say, if their weight is counterbalanced by the force of the light-repulsion. At times of "maximum," when the solar surface in the sunspot (*i.e.* equatorial) region is most disturbed, the local disturbances, and their consequent convection currents, modify the action of the normal centrifugal forces, and thus produce the *abnormal* coronas observed at eclipses occurring during periods of maximum solar activity, which, although of the same general form, vary greatly in their detailed features.

RADIANT POINT OF THE BIELID METEORS.—From a number of observations of the Bielids made on November 21, 1904, Herr K. Bohlin, of Stockholm, has calculated the radiant point of the shower.

The resulting position is only about  $3^{\circ}$  from  $\gamma$  Andromedæ, and has the following coordinates:—

1904 November 21.33 (Mid-European time).

$$\alpha = 26^{\circ} 2' \}$$

$$\delta = +43^{\circ} 10' \}$$

(*Astronomische Nachrichten*, No. 3997.)

BRIGHTNESS OF ENCKE'S COMET.—The results of a number of magnitude observations of Encke's comet, made by Herr J. Holetschek, at Vienna, during the present apparition, are published in No. 3997 of the *Astronomische Nachrichten*. The observations covered the period November 25—December 27, and, in the table wherein the results are shown, the vertical diameter, the magnitudes of the nucleus, and the magnitudes of the whole comet are given. From the last-named values we learn that on November 25 the magnitude of the comet was 9.0, on December 10, 6, and on December 23, 5.3. The value obtained on December 27 was mag. = 5.0, but this is queried.

JANUARY FIREBALLS.—A note from Mr. Denning to the *Observatory* (No. 355) shows that the appearance of fireballs during the predicted dates in January was well sustained. On January 14 a bright object was seen by several observers, and on combining the records a radiant point situated in Monoceros at  $119^{\circ} + 3^{\circ}$  was obtained. The height of this fireball ranged from 60 miles over Brecon to 29 miles over Aberystwith. Two fireballs were seen on January 27 and one on January 29, thus corroborating the January 28 epoch. One of those on the former date was very bright, and was apparently stationary at  $118^{\circ} - 18^{\circ}$ .

In February, bright fireballs were seen on February 11, 13 and 18, the time of the apparition on the last-named date being 7h. 15m. a.m., *i.e.* in daylight.

ROTATION OF JUPITER'S SATELLITES I. AND II.—During the period January 13-20, Dr. P. Guthnick, of Bothkamp Observatory, made a series of magnitude observations of Jupiter's first and second satellites, the period of observation covering about four revolutions of the former and two revolutions of the latter round the planet.

The measurements were made with a Zollner photometer attached to the 11-inch refractor. Plotting the values obtained on curves having the "anomaly" of each satellite as abscissa and the corresponding apparent magnitude as ordinate, it was seen that the period of the light-variations coincided with that of the revolution about Jupiter, and as a consequence it seems probable that the periods of revolution and rotation are coincident in each case (*Astronomische Nachrichten*, No. 4000).

ORBITS OF MINOR PLANETS.—In No. 4000 of the *Astronomische Nachrichten*, Prof. J. Bauschinger publishes the